



MEMORANDUM

Virginia Water Control Board

Office of Water Resources Management

4900 Cox Road P.O. Box 11143 Richmond, Va.

STATE WATER CONTROL BOARD

Subject: Broad Creek Model
To: E.R. Simmons, KRO
From: M.D. Phillips
Date: September 22, 1992
Copies:

SEP 28 1992

Tidewater Region
Kilmarnock Office

I have looked at the Broad Creek situation and assessed several different modeling approaches, all give the same results. I looked at a simple flushing approach, a tidal prism approach and used AUTOS\$ with very conservative parameters. All models agree that the discharge of conventional pollutants from the six small STPs proposed to the creek have no calculatable effect on the dissolved oxygen of the creek. In fact, the models indicate that this will be true to at least an aggregate flow of 1.0 MGD.

The models and approaches I have looked at are all limited because there is no data available. However, I did use very conservative assumptions and believe that the results are dependable. The basic reason for the lack of impact is essentially the rapid tidal flushing; I estimate that about 1/4 to 1/3 of the volume of the creek is exchanged over each tidal period. This coupled with the very large dilution provided for the six small STP flows (6000 to 20,000 GPD for a total of about 60,000 GPD) results in essentially no impact.

I share your concern about the proliferation of small treatment plants at the marinas on this creek and believe that a central facility discharging outside the confines of Broad Creek would be much better in the long run. However, it appears that there will be little or no observable effects on the dissolved oxygen at this time.

I will only attach one model run (AUTOS\$) as illustrative of the results. The bottom line is that we can assign secondary limits until the aggregate flows approach 1.0 MGD.

Regarding toxic material (ammonia, etc.), the models I used do not have the capability to look at mixing for toxics. Since the two existing and 4 proposed STPs are all surface discharges to saline waters I have no models to apply at this time. I would recommend that you simply use the guidance package recently provided for the implementation of toxics limits.

cc Rod Smith, Jim Uzel page 1 - Mlen PDC